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ABSTRACT

Five research studies dealing with spelling achievement in New Zealand schools have been conducted; these include dictated-word spelling tests, written language studies, and achievement data collections of 20,000 students. Several conclusions emerge from an examination of this research: spelling achievement studies should be based on samples of written language, should concentrate on in-depth analysis of written language samples, should test extensively, and should employ appropriate statistical techniques rather than simply using mean scores and percentages; tests should sample broadly among pupils and words; and tests should refrain from using studies not originally designed to investigate changing levels of performance to support a thesis of changing levels. It appears that factors outside the school have much to do with spelling achievement, although little has been done to validate current teaching approaches. The apparent test score declines could be explained by changed teaching emphases as well as by problems with research methodology. Data is lacking to make reliable generalizations about changing levels of achievement over time. (DF)

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Spelling Achievement: Weighing the Research

by Cedric Croft,
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Studies of spelling are not particularly numerous in New Zealand, the 2 standard bibliographies listing no more than 20 completed during the last 50 years. All but two of these studies appeared before 1970, and only five are more recent than 1960. The majority are diploma of education investigations, interred in university libraries and rarely, if ever, consulted. Of the others a handful have achieved, quite recently, in the context of the debate over falling standards,* a position of some eminence and authority. Three of these studies, by Winterbourn, Francis, and Freyberg, are based on data derived from dictated-word (DW) spelling tests. The others, by Arvidson, and Nicholson, employ data gathered from samples of written language. What evidence do these five studies contain, and how can or should it be interpreted? In particular, what light do they throw on the question of spelling achievement?

Dictated-word studies

In 1931 Winterbourn set out to:

1. Standardize the *Burt Standardized Spelling Test* on a limited sample of New Zealand children.
2. Compare the spelling achievements of a group of Christchurch children on this test with a sample of London children.

The basis of the study, the *Burt Standardized Spelling Test*, was at that time regarded as a valid and reliable measure of spelling. It had been standardized on a little over 5000 London school children, and provided both a raw score and spelling age for each pupil. In the Christchurch survey, the test was administered to 3511 children aged 9.0 to 14.11, representing 'all the pupils of these ages from 11 primary and 4 secondary schools, selected so as to give a fair sampling of children for purposes of comparison.' The major comparison was between the mean spelling ages of each age group in Christchurch against London.

Results:

1. Up to the age of twelve and a half Christchurch children averaged more words correctly spelt than did the London children.
2. For older age groups the mean scores were either equal, or the London children averaged more correct spellings. However, no information on the significance of the difference was given.
3. There was more variation in the scores of the Christchurch children than in the scores of the London children. This trend was more pronounced for boys than girls.
4. In both samples, but less so in the London group, girls achieved higher means than boys.

It should also be noted that Winterbourn made an attempt to relate the findings from particular classes to the methods of teaching spelling in those classes. Nothing conclusive emerged however.

Seventeen years later Francis set out to survey the spelling achievement of 9 to 14 year old pupils in a representative group of Christchurch schools, and also to make comparisons with Winterbourn's survey. Francis used the same schools as Winterbourn, with the addition of South Intermediate, which, by 1948, some pupils from the original schools were attending. The procedures Winterbourn used were followed, with some additional checks for marking accuracy included. The 3350 children in Francis' study represented all the pupils of the appropriate ages in the following schools: Linwood Avenue, Linwood North, Opawa, Woolston, Phillipstown, Sydenham, Normal, Cathedral Grammar, South Intermediate, Addington, Fendalton, St Albans, West High, Christchurch Girls, Christchurch Boys.

Results:

1. Both boys and girls in the nine and a half year group averaged more words correct than their 1931 counterparts, the mean increase being 4.5. Changes in the standard deviations suggested that the below-average boys and above-average girls had done better than previously.
2. For all other age groups therre was a small decline in mean performance: boys about 3.2 and girls about 1.4. However, there is some doubt about the validity of the boys' results, as it was not possible to complete testing at Christchurch Boys' High School. This omission probably contributed to the magnitude of the decline in the boys' scores, as it is likely that these pupils would have achieved above-average scores.
3. In all cases the standard deviations had slightly increased, and this, together with the drop in mean scores, suggests that the below-average pupils were primarily responsible for the decline.

In a brief discussion Francis suggested that the declines he discovered were probably due to the following factors:

1. Proficiency examinations were abolished between 1931 and 1948. As a result, less emphasis was being placed on the rote learning of spelling, in favour of developing more diverse written expression skills.
2. The mode of life had changed between 1931 to 1948, in a way that produced more distractions in the homes of most children.
3. The influences of World War II on the children and on the staffing of schools.

One important possibility apparently overlooked by Francis is that of sampling. Francis used the same schools as Winterbourn, but, during the intervening period, the number of schools in Christchurch had increased, and Christchurch had begun growing towards the north-west, so the question is: 'Would the sample of 1931 schools still be a representative sample of all schools in Christchurch in 1948?'

In 1960 the *NZCER Alphabetical Spelling Lists* were published, and during 1961 they were progressively introduced into schools. In November 1960, with the aim of assessing the effectiveness of the changed approach to the teaching of spelling that accompanied these books, Freyberg sampled the performance of Palmerston North and Feilding Standard 3 pupils on a DW test, and he also collected a 15 minute sample of their written language. He therefore had measures of words right on a DW test, the number of words written and the percentage of errors recorded in a 15 minute sample of writing. The exercise was repeated in 1962, and the results of both studies were published in 1964.

Results:

1. For those schools which had changed their approach to the teaching of spelling there was a statistically significant increase in errors on the DW test. But it was also noted that one school that did not change its approach to the teaching of spelling during the period 1960 to 1962 also showed a significant increase in number of errors. Freyberg attributes this to a decrease in the mean level of intelligence of pupils in this school during the period.

* For a discussion of this much misused word see Reid, N.A., 'Standards, Basics and National Assessment', *set 78*, No. 1.

2. A further breakdown of the results into upper half and lower half revealed that:
   i where individually compiled lists were used, 19 percent of the children made 25 errors or more;
   ii for teacher-provided lists 12 percent of children made 25 errors or more;
   iii the proportion of children making 33 or more errors increased from 4.5 to 9 percent.
3. Children in the schools using the alphabetical lists wrote less and had a smaller proportion of errors than those in schools which had not changed their procedures. Presumably, the smaller number of words written is a result of the time taken to consult lists, and the smaller number of mistakes a result of greater skill and awareness of the importance of 'looking up' words that are troublesome.

On the basis of these results, Freyberg concluded that there appeared to be a case for the continued use of teacher-provided lists for poorer spellers and for younger children.

In 1973 Freyberg reported a follow-up of his earlier study. The same data-collection procedures, and the same types of measures were used. During the period 1960 to 1972 two new schools had been established and one school had undergone a marked change in its racial composition. These three schools were excluded from the main comparisons although it was later shown that the difference between their means and the mean for the rest of the sample was not significant.

Three other schools, which had taken part in the 1960 and 1962 data gathering, elected not to take part in 1972. However, Freyberg concluded that their absence did not affect the overall results. Nonetheless, the later study was based on 10 schools, whereas 14 had been used a decade before.

Results

1. There was a statistically significant increase in errors on the DW test from 1960 to 1962, and a further increase from 1962 to 1972.
2. Over the period 1960 to 1972 the error rate has increased by 6.8 percent for the complete sample.
3. Between 1960 and 1972 the mean error score for the upper half of pupils increased by 1.15 percent. This was not statistically significant.
4. For the lower half the mean error increase was 2.76, or 6.9 percent for the first 2 years, (i.e. 1960 to 1962) and a further 2.41 or 6.02 percent for the next ten years (i.e., 1962 to 1972); a total of 12.88 percent. This was a highly significant increase.
5. An interesting parallel pattern between the mean numbers of words written and the mean numbers of errors was also apparent; a decrease from 1960 to 1962, and an increase to 1972. The error increase from 1960 to 1972 was statistically significant.

Most of the changes that were found over the 12 year period were statistically significant, and indicated a lowering of spelling test performance. The educational significance of these results however, is much more difficult to assess. The proportion of errors in the DW test increased from 32 percent to 38.8 percent, and the proportion of words incorrectly spelt in the sample of written work increased from 3.68 percent to 4.14 percent. This does not appear to be a serious decline, especially if there have been gains in other areas; for example, an increased fluency in written expression as may be indicated by the increase in the total word counts for 15 minutes writing.

Notwithstanding this however, changes in teaching methods are usually evaluated in terms of the changes they bring about in the achievements at which they are directed. Why then had an individually based method not resulted in higher all-round spelling attainment? Firstly, according to Freyberg, there was some indication that the use of individual spelling lists was not as efficient as could be desired. Of the 10 schools on which the major comparison was based, 3 indicated that they still relied mainly on individual error lists compiled by children: in all of these schools there was an increase in the mean number of errors on the DW test over the 12 year period. The other seven schools stated that they had moved away from their 1962 practice of using just individual lists, and now combined individual lists with some regular teacher-provided lists and class instruction. Five of these seven schools showed a decrease in the mean number of errors between 1962 and 1972, and all but one actually showed a decrease from 1960, when they were using just teacher-provided lists.

Some additional evidence is to be found in the large increase in errors recorded by the lower half of the group. It must be remembered that the 'levels' incorporated in the *NZCER Alphabetical Spelling List* are arranged according to frequency of usage, not spelling difficulty. Some of the high frequency words are very difficult for children to spell (e.g. friend, coming, minute) or to learn the correct usage of (to, too, two; their, there) so as a result, the less able speller may not get the opportunity of progressing through the levels and so of learning the easiest of the higher level words (e.g. raft, stir, skirt, tune). Freyberg also pointed out that the necessity for a levels of frequency spelling system has never been demonstrated experimentally. Finally, no attempt was made by Freyberg to show that his sample was representative of the national population in terms of ability, so any generalizations drawn from his findings must be treated with caution. In addition, it is worth bearing in mind that this investigation was confined to one class level only.

An assessment

The main thing to understand about these quite important studies is that, with the possible exception of Francis, none of them were designed to be an investigation of spelling performance *per se*. Winterbourn, for example, was primarily concerned with checking the appropriateness of the London norms of the *Burt Standardized Spelling Tests* for Christchurch children aged 9 to 15. Francis had the same purpose but, in addition, attempted to measure changes in performance over the period 1931 to 1948. Freyberg was investigating some of the effects of a curriculum change, and was only incidentally interested in spelling performance. Because these studies were not specifically designed to investigate levels of spelling performance it is inappropriate to use them in any discussion of spelling standards.

Secondly, the bulk of the 'evidence' they provide comes from performance on DW spelling tests. Now a DW test requires the child to demonstrate that he can spell a *specific set of words*, the choice of these words being outside his control. When a person is engaged in written language, however, the choice of words is largely in his own hands. Words that are likely to be misspelled can be replaced by synonyms, or completely by-passed by reconstructing the sentence. The writer is not 'forced' into using any words that he may be uncertain how to spell, but he is able to choose words with which he is familiar, and thus increase the spelling accuracy of his written communications. Since a major objective of most classroom spelling programmes is to encourage children to spell accurately in written language, and not simply in the artificial DW spelling test situation, the validity of using DW test scores as conclusive evidence of spelling accomplishments must be seriously questioned.

Finally, these studies used small samples and were restricted to only a few localities.

We do a disservice to research studies when we try, after the event, to make them answer questions they were not originally designed to answer. These studies are important landmarks in spelling research in this country, but they should not be used to make inferences about spelling performance in the past — mainly because of sampling difficulties, but also because of the emphasis on DW test data.

Written language studies

Performance on traditional spelling tests does not provide valid information on spelling competencies in written communication. Indeed, only data derived from written language can do that. In this connection it should be noted that Freyberg did collect samples of written language, in an attempt to get a more valid measure of spelling performance. However, his analysis was restricted to reporting the number of words written and the mean percentage of errors. Much more intensive studies of children's written language have been carried out by Arvidson and by Nicholson.

In 1952 Arvidson undertook a survey of the written expression of 6267 Auckland children from Standard I to Form II, in order to ascertain the frequencies of words written and number of misspellings. The data were then to be related to spelling lists in use at that time. Arvidson's work formed much of the basis of the *NZCER Alphabetical Spelling List*, published in 1960.

In 1969 and 1970 Nicholson repeated Arvidson's survey, in order to isolate changes that may have taken place in the spelling performance of a representative sample of Auckland children. He asserted that it was necessary to begin an evaluation of spelling performance by establishing whether there had been any increase or decline in the number of spelling errors made by children, relating the findings of this investigation to teaching methods.

A sample of 20 contributing and 10 intermediate schools was chosen and the representativeness of the sample was demonstrated by relating proportion of children from 'white collar' homes in the participating schools to the proportion of 'white collar' homes in the population of urban Auckland. Each child wrote two essays under typical classroom conditions: essay A with the help of spelling references, essay B with no spelling aids. The essays were paired, and the same number that had been used by Arvidson at each class level in 1952 were then randomly selected. A frequency distribution of all errors found in this sample of written work was made. In addition, the following information was gathered:

1. The most frequently misspelled words at each class level.
2. The differences between essays written with the help of spelling references and essays written without access to such aids.
3. Data on the spelling performance of a sample of Polynesian and European children.
4. The words that had an error incidence in excess of one percent, i.e., the 'main errors'.

An error was marked only the first time it appeared in any one child's work. In addition 'the child was not expected to know proper names or technical terms unless they were so familiar in the child's district or general knowledge that he could reasonably be expected to learn them'.

Results:

1. Compared to Arvidson's 1952 survey, the number of words written per essay in Standards 1 to 4 had increased. In Standard 2 the increase was 40 words; in the other standard classes the increase ranged from 24 to 28. In Form I and II the means had declined marginally, the larger decline being in Form I, where Nicholson's sample averaged 12 words less per essay.
2. The total number of errors had increased slightly at all class levels. The range of this increase was 0.02 (at Standard 3) to 1.44 (at Standard 4) mean errors per essay.
3. The number of errors, as a percentage of the words written, decreased in Standards 2 and 3 and increased in the other classes.
4. Girls wrote more than boys under each condition and also averaged fewer errors than boys.
5. When errors were expressed as a percentage of words written for European and Polynesian groups, it was found that the Polynesians averaged slightly more errors than the Europeans at each class except Standard 1. In only one case, however, did the difference exceed one percent.
6. Of the 10 most frequently misspelled words for every class level 6 were common to all levels: two, too, off, their, there and they. It will be recognized immediately that spelling these words incorrectly may be more a function of confusion over usage than of inability to spell accurately.

Mean Percentages of Pupils Misspelling the 10 Most Frequently Misspelt Words

Word	1952	1970
off	6.75	6.70
too	6.29	8.95
their	5.97	5.80
there	3.40	5.22
an	3.21	4.47
where	2.53	3.33
they	2.41	3.51
to	2.11	2.35
two	2.03	2.15
were	1.81	2.52

7. The percentage of children misspelling the 10 most commonly misspelt words increased at all class levels. At the Standard 1 level, the increase was from 3.48 percent to 4.90 percent. At the Form II level it was from 3.46 percent to 4.33 percent. In all other cases the increase was less than one percent.
8. At all class levels the number of words that were misspelt by more than one percent of the sample increased. As a percentage of words written, however, these 'main errors' averaged .04 percent in both 1952 and 1970.
9. Although the numbers of words misspelt by more than one percent of the sample were fairly similar in both surveys, the words themselves varied.

Number of Words Misspelt by More than One Percent of Pupils in Either 1952 or 1970

	In 1952 but *not* in 1970	In 1970 but *not* in 1952
S1	36	72
S2	47	43
S3	42	55
S4	27	32
FI	6	24
FII	3	18

10. Of the words that were misspelled by more than one percent of the sample at each class level in 1952 and 1970, more misspellings occured in 1970 at all class levels. The most pronounced differences were at the Form I and II levels.

Number of Words Misspelt by More than One Percent of Pupils in 1952 and 1970

	Words	Misspelt in 1952	Misspelt in 1970	Equally Misspelt
S1	31	6	22	3
S2	46	22	22	2
S3	40	15	20	5
S4	26	11	12	3
FI	21	2	18	1
FII	17	1	15	1
		57	109	
	As percentage of words written	.006	.01	

The overall weight of Nicholson's survey does suggest that there was a small decline in spelling accuracy over the period 1952 to 1970. However, one confounding factor in the study is the difference in the number of words written. The 1970 sample had more opportunity to misspell words because they wrote more words: 1,076,130 compared to 885,707. When one corrects for the differences in the number of words written the overall error rates were in fact 3.92 and 3.98 per 100 written words respectively, a shift of such a small nature that it may be largely explained by the increase in the Polynesian population, and a lowering of the median age of Form I and Form II children.

Total Errors Expressed as a Percentage of Words Written

	1952	1970	
S1	6.99	7.16	.17 increase
S2	6.33	5.26	1.07 decrease
S3	4.57	3.89	.69 decrease
S4	2.57	2.97	.40 increase
FI	1.80	2.50	.70 increase
FII	1.43	2.04	.61 increase

It would seem reasonable to assert that studies like those of Arvidson and Nicholson do provide more valid information about spelling performance in the context of written languages, than do studies that are based on DW tests. However, it must be remembered that these studies were restricted to the Auckland urban area alone and that the more recent of them was conducted 8 years ago. Thus we cannot use them to draw conclusions about current spelling performance; nor can we generalize the findings, even for 1970, beyond Auckland city.

One final point. The Arvidson/Nicholson data suggest a small, overall deterioriation in the spelling performance of Auckland primary school children between 1952 and 1970. What they should have shown, given the changes that have taken place in the spelling curriculum since 1952, was some increase in spelling attainment. It is legitimate to ask why they did not.

Recent work

A more recent piece of research into spelling was carried out by Croft during 1975, in which comparisons were made between large, representative samples of primary school children. Data on the first (1961) sample were produced by Arvidson, as part of his evaluation of the uses of the *NZCER Alphabetical Spelling Lists*. The second (1975) survey was undertaken to gather information about the teaching of spelling, but the opportunity was taken to collect achievement data on the large sample (20,000) of pupils included. The unit of measurement for both studies was the 'spelling level', an index based on teacher-administered tests, but one that should also reflect a child's day-to-day spelling accomplishments.

Results

1. At all class levels, apart from Form II, the median levels achieved by the 1975 sample were superior to the median levels achieved by the 1961 group.

Median Levels of Sample from Two National Surveys by Class

Survey	Std. 1	Std. 2	Std. 3	Std. 4	Form I	Form II
1961	1.37	2.42	3.23	4.45	5.39	6.43
1975	2.16	2.52	3.52	5.00	6.29	6.39

2. Standard 1 and Form II were the two classes which showed the greatest differences in attainment over the period.

In order to put these findings into perspective, however, two important considerations must be borne in mind. Firstly, the median levels from the first survey represent mid-year attainment; the data on which the second set of figures are based were collected during October and November. This would tend to inflate the scores of the 1975 sample. Secondly, a larger proportion of children at each class were following a 'levels' approach to spelling in 1961 than in 1975. This is particularly so at the upper class levels. For example, in 1961 85 percent of Form I had been classified by spelling level. By 1975 this figure had dropped to 69 percent. The reasons underlying this change are not entirely clear but it could be that the levels approach has fallen somewhat out of favour with teachers of lower-ability children. If so, this would tend to inflate the score of the 1975 sample.

The 1975 survey is the most up-to-date information we have on spelling performance in New Zealand. In view of the qualifications expressed above however, the only valid conclusion one can draw from this study is that there is no evidence of either marked decline or marked improvement in median spelling levels achieved by samples of pupils in 1961 and 1975.

Conclusions

The first conclusions one can draw from a survey of the research studies above relate to methodology.

1. Studies of spelling attainment should be based on samples of written language. However, studies of this kind do present special methodological problems. For example, extremely accurate timing is essential when the writing samples are being collected if any credence is to be placed on the number of words written. Perhaps even more important are the criteria to be adopted in marking. Is every error to be counted, are mistakes in proper nouns to be ignored, is an error to be counted every time it occurs or only the first time it is made, are only errors in basic words to be counted? Perhaps the biggest problem is to reconcile the accurate spelling of simple, high frequency words with the less accurate spelling of more complex words. Apart from using subjective judgement, there seems to be no valid way of measuring the 'quality' of vocabulary in written language. It would seem to be very important to obtain some index of the vocabulary being used by children in their written language, so that this quality can be interpreted against existing measures of accuracy. It may be quite acceptable to sacrifice some spelling accuracy for improvements in the quality of the vocabulary being used, but without reliable methods of measuring 'quality' such evaluations cannot be made. Nonetheless, despite their methodological difficulties, one must stress again that studies of written language are more valid indicators of spelling competencies in written language than test-based studies.
2. If we wish to discuss or investigate changes in spelling performance we must look for, or design, studies that:
   i Concentrate on in-depth analysis of samples of written language.
   ii Test extensively, ensuring that the measures used are both valid and reliable.
   iii Employ appropriate statistical techniques in reporting results. Mean scores and percentages are *not* enough.
   iv Sample broadly, both as regards pupils and words to be spelt.
3. Studies which were not originally designed to investigate changing levels of spelling performance should not be used to support a thesis of either rising or falling levels of attainment. The objection is mainly a methodological one, the data these studies contain usually being inappropriate for *post hoc* discussions of that kind.

The next set of conclusions have to do, broadly, with causes.

1. It is evident from an examination of the explanations that have been advanced to explain apparent declines in spelling attainment that factors outside the school may be of great importance. At the same time, one can but note that little is

being done to experimentally validate the variety of approaches to spelling that exist in our schools.

2. Horn has suggested that an apparent decline in spelling attainment in America during the 1960s can be partly explained by a decline in interest in spelling during that period. It is likely that this argument could be extended to New Zealand too, since from the early 1960s the emphasis on learning set lists of spelling words has been replaced by approaches that have concentrated on promoting accurate spelling of appropriate words in written language.

In addition to the factors of low interest in, and concern for, the importance of spelling already mentioned, other factors that could account for the lowering of spelling test performance over time include:

i Lowering of prestige value of a student's ability to spell.

ii Changes in curriculum objectives.

iii Reduced emphasis on developing the technical skills of written language.

iv A decline in the systematic teaching of spelling, possibly resulting from erroneous interpretation of the values and limitations of 'incidental learning'.

v Differences in sampling procedures and the population studied.

vi Decline in the validity of the measures used.

The final conclusion is simply this. Spelling achievement may have fallen over the last 40 years, it may even have risen. We can't be sure either way. Why? *Because we do not, in 1978, possess the objective data that will allow us to make valid generalizations about changing levels of spelling achievement over time.* Will the same conclusion be necessary in the year 2000?

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